

monitoring has an adverse effect on quality of life, with higher levels of distress, worry, and depressive symptoms, particularly if patients test more than once a day.⁴

The impact of home blood glucose monitoring in type 2 diabetes was considered in an NHS health technology assessment in 2000.⁵ Many studies identified were poorly designed, lacked statistical power, and were difficult to compare as the groups of patients were different and because glucose monitoring may have been just one part of a multifactorial intervention programme. A meta-analysis was performed on data from four studies in people with type 2 diabetes that compared home monitoring of blood glucose or urine glucose with no monitoring. Glycaemic control (as assessed by glycated haemoglobin) between the two groups was found to be no different. No difference was found in glycated haemoglobin in three studies that compared people who monitored blood glucose with those who monitored urine glucose. Moreover, individual studies did not provide evidence of other potential benefits such as reduction in episodes of hypoglycaemia or improvements in quality of life.

The guidelines from the Scottish Intercollegiate Guidelines Network offered no recommendations about home blood glucose monitoring in type 2 diabetes, concluding that there were no studies that had adequately assessed the benefits of glucose monitoring in glycaemic control.⁶ By contrast, the National Institute for Clinical Excellence supported the use of home blood glucose monitoring in type 2 diabetes,⁷ although it indicated that this should be taught only as part of "integrated self care" and "if the purpose... is agreed with the patient." More recently, a multidisciplinary group of healthcare professionals published consensus advice on home blood glucose monitoring.⁸ The group agreed that such monitoring was not required routinely in type 2 diabetes but suggested that people should monitor in special circumstances. These included measuring blood glucose once a day during intercurrent illness, when oral hypoglycaemic treatment is changed, if systemic glucocorticoids are prescribed, and if post-prandial hyperglycaemia occurs. Home blood glucose monitoring was also suggested for patients taking sulphonylureas because of the risk of hypoglycaemia. None of these recommen-

dations was supported by evidence from randomised trials.

If the scientific evidence supporting the role of home blood glucose monitoring in type 2 diabetes was subject to the same critical evaluation that is applied to new pharmaceutical agents, then it would perhaps not have been approved for use by patients. For people with diabetes controlled with diet and tablets, glycaemic control could be monitored more cost effectively by using glycated haemoglobin alone, measured at three to four monthly intervals. Common sense dictates that in some situations home blood glucose monitoring is desirable, such as when systemic steroids are prescribed or during pregnancy. However, we need to move away from consensus recommendations and perform large randomised trials examining the role of home blood glucose monitoring in type 2 diabetes. In addition, new models of blood glucose meters need to be subjected to the same rigorous evaluation of cost effectiveness as is applied to pharmaceutical agents.

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Competing interests: None declared.

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Aspartame and its effects on health

The sweetener has been demonised unfairly in sections of the press and several websites

The European population of 375 million consumes about 2000 tonnes annually of aspartame (NutraSweet, Canderel) an artificial sweetener, which contains two amino acids—aspargic acid and phenylalanine.¹ It is 180-200 times sweeter than sucrose, and almost half a million extra tonnes of sugar would therefore be needed to generate the same sweetness. Was the world screaming for all this sweetness, and what has it done to us? Anyone searching the web on aspartame, launched in 1981 by

Monsanto, the manufacturer of NutraSweet, will find a vast catalogue of frightening personal accounts attributing multiple health disasters to exposure to aspartame.¹ Although no orchestrated public outcry about aspartame has taken place, much sensationalist journalism has been published mostly on websites (for example, www.holisticmed.com/aspartame/). In contrast, aspartame marketing implies that it embodies a healthy way of life and avoids obesity. Are these claims of hazards and benefits supported by evidence?

Evidence does not support links between aspartame and cancer, hair loss, depression, dementia, behavioural disturbances, or any of the other conditions appearing in websites. Agencies such as the Food Standards Agency, European Food Standards Authority, and the Food and Drug Administration have a duty to monitor relations between foodstuffs and health and to commission research when reasonable doubt emerges. Aspartame's safety was convincing to the European Scientific Committee on Food in 1988,² but proving negatives is difficult, and it is even harder to persuade vocal sectors of the public whose opinions are fuelled more by anecdote than by evidence. The Food Standards Agency takes public concerns very seriously and thus pressed the European Scientific Committee on Food to conduct a further review, encompassing over 500 reports, in 2002. It concluded from biochemical, clinical, and behavioural research that the acceptable daily intake of 40 mg/kg/day of aspartame remained entirely safe—except for people with phenylketonuria.³

Does aspartame embody a healthy way of life and avoid obesity? In most Western countries sugar provides around 10% of total calories (about 200 kcal (837 kJ), or 50 g daily). If this were entirely replaced by a non-nutritive, non-caloric sweetener such as aspartame then obesity could indeed be vanquished—assuming these calories are not replaced due to stimulation of appetite. We eat about 5 g aspartame annually, equivalent to another kg of sucrose, whose 4000 kcal (16 740 kJ) could generate 0.5 kg gain in weight. But evidence that aspartame prevents weight gain or obesity is generally inconclusive,^{4–5} although in children, the consumption of sugar sweetened soft drinks relates notably to increasing obesity, whereas increasing “diet” drinks or fruit juice is inversely related to weight gain.⁶

Dietary recommendations for the management of diabetes conclude that up to 10% of total energy can safely come from sugars but that artificial sweeteners may help avoid weight gain.^{7–8} When sugar is consumed as a sweetener it is chemically identical with the sugar found in fruits, which we are promoting keenly, and its metabolic effects are no different if consumed in reasonable amounts even by people with diabetes.⁸ Most evidence points to fat as the main dietary culprit in obesity, and one counterargument to the use of artificial sweetener instead of sugar includes evidence that high sugar diets tend to be lower in fat.⁹ Displacing saturated fat would offer particular advantages by reducing risk of heart disease.¹⁰ Carried to extremes, large amounts of sucrose will increase triglycerides, a key component of the metabolic syndrome, and turn the tables back towards promoting heart disease. Its fructose component is responsible for this hazard.¹¹

Artificial sweeteners are promoted to prevent dental caries, as sugars form the main substrate for mouth bacteria. However, avoiding sugar does not reduce dental caries dramatically in regions with high levels of caries.³ The dominant factors are fluoride deficiency and prolonged exposure to sugar between meals. If children consume sweetened drinks between meals or suck on sweet foods, resulting in prolonged periods of exposure to sugar, then replacing the sugar with artificial sweeteners in such products has some rationale. Children exposed to heavily sweetened foods develop a “sweet palate,” but those who take the plunge and

take unsweetened drinks may prefer them, which seems a better solution.¹²

Why has aspartame been demonised by the world's press and countless websites? Monsanto was in the public eye, accused of enthusiastic dissemination of genetically modified plants and foods. People resent interference with foods, and synthetic food components are regarded with suspicion. However, aspartame comprises just two amino acids (aspartic acid and phenylalanine). Could this present a risk? Phenylalanine is a natural amino acid, and is toxic only in patients who have phenylketonuria.

Food labelling of sweetener is contentious. Six artificial sweeteners are permitted in Europe, each with an acceptable daily intake. Consumers cannot be expected to calculate cumulative daily intakes of each. Instead, manufacturers are encouraged to use cocktails of sweeteners so it becomes difficult for anyone to reach the acceptable daily intake of any sweetener individually—adults need at least 10 cans of a drink fully sweetened with aspartame alone to reach the acceptable daily intake of 40 mg/kg/day. When using combinations of sweeteners, even high level consumers rarely exceed 10 mg/day. Intakes over 1g/day were needed to alter brain neurotransmitters and provoke seizures in monkeys, and randomised controlled trials of high doses in humans have not shown any behavioural or other effects.^{13–14} The cynical conclusion is that there is probably too much sweetness and never enough light, and the public probably needs protection against misleading websites.

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Competing interests: None declared.

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